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Taxonomic Studies of Himalayan *Potentilla* (Rosaceae). I. *P. makaluensis,* a New Species in Sect. Leptostylae

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ヒマラヤ産キジムシロ属（バラ科）の分類学的研究 I
Leptostylae 節の 1 新種

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A new Himalayan *Potentilla* in the section Leptostylae, *P. makaluensis,* is described. *Potentilla makaluensis* occurs only in eastern Nepal, and similar to *P. microphylla* and *P. commutata,* but differs in some morphological characters. *Potentilla makaluensis* has a mat-like structure consisting of long, slender rhizomes with a few scaly leaves while *P. microphylla* has profusely branched under ground rhizome forming cushion and *P. commutata* is rosulate with few branched rhizomes. In the latter two species, the rhizomes have no scaly leaves. The number of leaflets of *P. makaluensis* is 9–11 and apparently fewer than those of *P. microphylla* with 15–27 and *P. commutata* with 13–31. Petals of *P. makaluensis* are elliptic to broad ovate while those of *P. microphylla* and *P. commutata* are ovate to elliptic.

Genus *Potentilla* (Rosaceae) consists of about 300 species, distributed mainly in the Northern Hemisphere from temperate to arctic or alpine regions. This genus is usually divided into two groups, Trichocarpae with shrubby or ligneous habit and Gymnocarpae with herbaceous habit (Wolf 1908). There are four sections in Gymnocarpae, in which sect. Leptostylae (Wolf) Yü et Li is considered to be a primitive group (Yü and Li 1980, 1985).

Section Leptostylae is concentrated to the alpine regions of the Himalaya and the southeast Asia except *P. anserina* L. ranging from seacoasts to mountain regions of Asia, Europe, N America and the Southern Hemisphere, New Zealand and Chile. Rousi (1965) found that *P. anserina* showed much variation in the Himalaya. She concluded that the Himalaya was the center of diversification of sect. Leptostylae. For considering the relationships in genus *Potentilla,* sect. Leptostylae is one of the key sections and the Himalaya is thought to be the best place to make biosystematic studies.

Even though Rousi's studies, the circumscription of the Himalayan species is still not clear. One

of the reason is that the ample materials have not been accumulated because they grow in higher elevations more than 4000 m, and another reason is that the reliability of morphological characters is not evaluated. In order to recognize the species, at least it is necessary to consider the variation as well as the stableness of the reliable morphological characters of each species.

During the participation in Japan-Nepal co-operative botanical research teams in 1988 and 1990, Ikeda collected one *Potentilla* belonging to sect. Leptostylae in wet places near Shipton Pass, north of Num, Sankhuwa Sabha District, Koshi zone of eastern Nepal. After examining the morphological characters, this has become clear to be an undescribed species.

This paper aims to describe the new species, *P. makaluensis,* comparing with its close relatives in sect. Leptostylae.

Potentilla makaluensis Ikeda et H. Ohba, sp. nov. Figs. 1–2.

Potentillo microphyllo D. Don primo adspectu maxime similis, sed a qua planta tegetes formante cum rhizomatibus gracilibus longe repentibus quibus foliis degeneratis sparse ornatis et stipulae lobis membranceis adnatis statim dignoscenda. A *P. commutato* Lehm. similis, sed rhizomatibus longe repentibus, foliolis numero 9 vel 11 (non 13–31), pistillis numero 20–35 (nec 40–80) vene differt.

Perennial acaulescent herb, creeping with long rhizomes and forming a dense mat at wet place. Rhizomes slender, 1.5–3.5 cm long, pale brown with sparse degenerated leaves of which stipules surround the rhizomes. Radical leaves numerous, forming a rosset 2–4 cm long; imparipinnate with 4–5 pairs of lateral leaflets, petiolate; petioles 4–10 mm long; laminas oblanceolate, 1.5–4 cm long, 0.6–1 cm wide, strigose with apressed or ascending, straight, stiff hairs on the petioles and both surfaces of laminas (especially on under-surface, margins and veins). Terminal leaflet subsessile, oblong to obovate, 3–7 mm long, 3–4.5 mm wide, serrate with 5–9 teeth, lateral

Fig. 1. Habit of *Potentilla makaluensis.*

leaflets sessile, gradually smaller towards the basal one. Stipules membranaceous, brown, adnate to the middle of petiole, lobes fused with each other forming a narrow ovate or lanceolate laminar structures.

Peduncles axillary from radical leaves, 1.5–4 cm long, with one or two cauline leaves. Cauline leaves simple, oblanceolate, apically 1–3 lobulate, together with the peduncles strigose with appressed or ascending, straight, stiff hairs; stipules lower half fused, upper half greenish and laminar-form.

Flowers solitary, actinomorphic, opening upright, 1–1.5 cm across. Hypanthia 0.5–0.8 cm across. Epicalyx lobes 5, oblong to elliptic, 2–3 mm long, 1–1.5 mm wide, apex acute, strigose on outer surface and margin, upper half pilose with minute hairs. Calyx lobes 5, elliptic to ovate, 3–4 mm long, 2–3 mm wide, apex acute to obtuse, strigose with unicellular straight, appressed, stiff hairs on outer surface side and margin, glabrous on inner surface, short lanate on upper part of the surface. Petals 5, spreading, bright yellow, obovate to broad obovate, apex rotundate, 5.5–7 mm long, 5–7 mm wide.

Stamens 20, 3-circular; alternipetalous ones 5, from the inner circle long, 2–3.2 mm long; oppositipetalous ones 5, from the middle circle short, 1.2–1.7 mm long, those located between petals and calyx lobes 10, from the outer circle, 1.5–2.5 mm long. Anthers orbicular, sub-basal, 4 locules, 0.7–1 mm long, 0.6–0.9 mm wide, dehiscent by longitudinal slits, bright yellow before dehiscence. Pistils 22–35, crowded on receptacles. Ovaries 1-ovulate, elliptic to ovate, 0.7–0.9 mm long, 0.6–1 mm wide, smooth. Styles lateral, 1–1.2 mm long, not swollen at the base. Stigmas slightly or apparently inflated. Placenta located at ventrolateral side near style base. Chromosome number $2n=14$.

Type and other specimens: Nepal. Koshi Zone. Sankhuwa Sabha Distr.: Khongma Kharka – Shipton Pass – Cha Ding Kharka, near Shipton Pass, 87°10'E 27°40'N, 4100 m alt. (M. Suzuki, N. Naruhashi, N. Kurosaki, Y. Kadota, M. Minaki, S. Noshiro, M. N. Subedi and H. Ikeda no. 8880826 on 20 July 1988, TI-holotype; KTM-isotype); ibid. (M. Minaki, C. Yonebayashi, F. Miyamoto, H. Takayama, H. Sugita, H. Yagi, M. N. Subedi and H. Ikeda no. 9080215 on 7 August 1990, TI, KTM).

Morphological differences. About twenty species of sect. Leptostylae have been described and reported from the Himalayan region (Don 1825, Lehmann 1831, 1856, Hooker 1878, Wolf 1908, Smith 1914, Handel-Mazzetti 1933, 1939, Fletcher 1950, Ohashi 1979, Yü and Li 1980, 1981, 1985, Grierson and Long 1987, Soják 1988a, 1988b). Among them *P. makaluensis* is similar to *P. microphylla* D. Don or *P. commutata* Lehm. in its gross appearance, but greatly differs by its habit and other morphological characters. The differences in significant morphological characters of these species are summarized (Table 1).

Potentilla makaluensis has a mat-like structure consisting of long, slender rhizomes with a few scaly leaves (Fig. 2A) while *P. microphylla* has profusely branched under ground rhizome forming cushion and *P. commutata* is rosulate with few branched rhizomes. In these two species, the rhizomes have no scaly leaves.

Potentilla makaluensis and *P. commutata* have membranaceous united stipule-lobes with round apex, but *P. microphylla* has two free triangular stipule-lobes with acute apex. These two forms of stipules are constant with no intermediate form between them is found. The number of leaflets of *P. makaluensis* is 9–11 and apparently fewer than those of *P. microphylla* with 15–27 and *P. commutata* with 13–31.

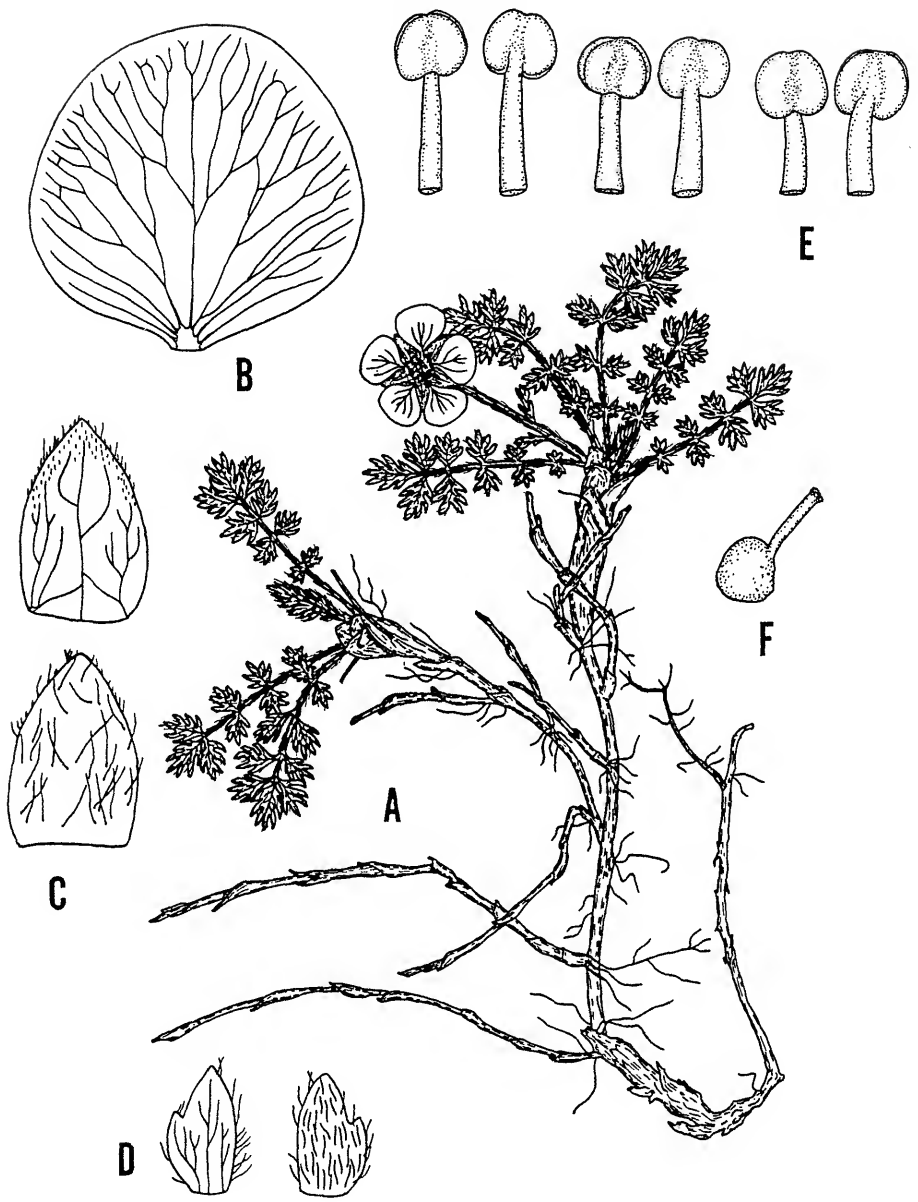

Fig. 2. *Potentilla makaluensis*. A, habit (×1.3); B, petal (×8.5); C, calyx lobes, inner surface (upper) and outer surface (lower) (×8.5); D, epicalyx lobes, inner surface (left) and outer surface (right) (×8.5); E, three types of stamens. Alternipetalous ones (left two), between petals and calyx lobes ones (middle two) and oppositipetalous ones (right two). For each pair, inner surface (left) and outer surface (right) (×12); F, pistil (×12).

Petals of *P. makaluensis* are elliptic to broad ovate while *P. microphylla* and *P. commutata* are obovate to elliptic. Epicalyx lobes of *P. makaluensis* are obovate, simple or shallowly incised while those of *P. commutata* are obovate but often deeply divided into two lobes but *P. microphylla* are lanceolate to broad lanceolate and usually divided into two lobes. The surface of calyx lobes of *P. makaluensis* and *P. commutata* are short pubescent on upper side, but *P. microphylla* are

Table 1. Comparison of morphological characters of *Potentilla makaluensis, P. microphylla* and *P. commutata*.

	P. microphylla	*P. makaluensis*	*P. commutata*
Habit	cushion-forming	mat-forming	rosset
Rhizomes	short, no scaly leaves	long, with a few scaly leaves	short, no scaly leaves
Stipules	free	fused	fused
No. of leaflets	15–27	9–11	13–31
Petals	obovate to elliptic	elliptic to broad ovate	obovate to elliptic
Epicalyx lobes	lanceolate to broad lanceolate	obovate	obovate
Surface of calyx lobes	glabrous	pubescent	pubescent
No. of pistils	10–30	20–35	40–80
Length of styles	1.0–1.7 mm	1.0–1.2 mm	0.4–0.8 mm
Habitat	rocky slope or cliff	wet place	on shady silt

glabrous. The number of pistils of *P. makaluensis* is 20–35, *P. microphylla* 10–30, but *P. commutata* 40–80. The length of style of *P. makaluensis* is 1–1.2 mm, *P. microphylla* 1–1.7 mm, but *P. commutata* 0.4–0.8 mm.

Ecology. These three species occur in the same area near Shipton Pass (Ikeda 1989), but they grow allopatrically. *Potentilla makaluensis* grows on heavy moist places beside cirque lakes or small streams while *P. microphylla* on gravelly slopes or cliffs and *P. commutata* on mossy glacial silts of shady places. These three species are, as already mentioned, differ not only in the rhizome character, but also in other vegetative and reproductive characters. Thus, it can be said that these three species are not ecotypes of a single species which adapt to the habitats by their rhizomes. This is one of the reasons why we described *P. makaluensis* as a new species.

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要 旨

ネパールヒマラヤの東ネパールマカルー地域シプトンパス付近で採集したキジムシロ属Leptostylae節の一種を新種として記載し，原産地にちなみ*Potentilla makaluensis*と命名した．この種は*P. microphylla*および*P. commutata*に類似するが，いくつかの形質で明らかに両種と異なる．*P. makaluensis*は地下で多数分枝し，鱗片葉のある長い根茎を持つのに対し，外の2種は長い根茎を持たず，根茎に鱗片葉は持たない．*Potentilla makaluensis*と*P. commutata*は合着した膜状で円頭の托葉を持つのに対し，*P. microphylla*は鋭頭の2裂片となる托葉を持つ．花弁は*P. makaluensis*が楕円形から広卵形であるのに対し，他の2種は倒卵形から楕円形である．生育地は*P. makaluensis*が湿地に生育するのに対し，*P. microphylla*は開けた岩場に，*P. commutata*は陰になるようなシルト質の土壌上に生育する．